General

Guideline Title

Prevention of firearm-related injuries with restrictive licensing and concealed carry laws: an Eastern Association for the Surgery of Trauma systematic review.

Bibliographic Source(s)

Crandall M, Eastman A, Violano P, Greene W, Allen S, Block E, Christmas AB, Dennis A, Duncan T, Foster S, Goldberg S, Hirsh M, Joseph D, Lommel K, Pappas P, Shillinglaw W. Prevention of firearm-related injuries with restrictive licensing and concealed carry laws: an Eastern Association for the Surgery of Trauma systematic review. J Trauma Acute Care Surg. 2016 Nov;81(5):952-60. [43 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

The strength of recommendation (strong or weak/conditional) and levels of evidence (high, moderate, low or very low) are defined at the end of the "Major Recommendations" field.

Population, Intervention, Comparator, and Outcome (PICO) Question 1

Should restrictive licensing policies be used to prevent firearm injuries?

Recommendation

The guideline authors recommend the use of restrictive licensing to decrease the incidence of firearm injuries.

The overall gun-murder rate has dropped by approximately 15 percent between 2006–2007 and 2009–2010 in a majority of the nation's 50 largest cities. Multiple, large, population-based studies have demonstrated an association between more stringent firearm purchase and ownership restrictions and firearm injuries. Although all of the studies are ecologic, the net effect and the magnitude of the net effect are significant and believable. It has biologic plausibility, as access to firearms has been linked in cohort studies to increased risk of both suicide and domestic homicide. The strongest studies were

rigorously analyzed for crucial covariates, such as state longitudinal firearm injury trends, impact of the crack cocaine epidemic, and effects of mass incarceration. With respect to individual provisions, background checks appear to be particularly impactful, but it must be noted that the data are mixed on other provisions, such as gun safety locks. These studies are also supported by the international experience, where more stringent gun control laws have been associated with lower firearm homicide and suicide rates, and fewer mass shootings.

PICO Question 2

Should concealed carry laws (CCLs) be used to prevent firearm injuries?

Recommendation

The guideline authors recommend against the use of CCLs solely as a strategy to decrease the incidence of firearm injuries within populations.

At the current time, the data do not support a "crime suppressive" effect of CCLs, and, in fact, may increase firearm injuries. However, no definitive conclusions can be drawn at this time, given the data limitations and mixed results. Crime rates do appear to influence applications for concealed carry permits, which could lead to a worrying cycle of increased concealed carrying, and further increases in firearm injury rates. The guideline authors suggest that ongoing longitudinal cohort studies of concealed carry permit holders continue, as some licensees were found more likely to commit assault and firearm-related crimes than case-matched controls in one study.

Refer to the original guideline document for definitions of restrictive licensing and CCLs.

Definitions

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Methodology Levels for Rating the Quality of Evidence

Quality Level	Definitions
High	Very confident that the true effect lies close to estimate of effect.
Moderate	Moderate effect; true effect is likely close to estimate of effect but may be substantially different.
Low	Limited confidence; true effect may be substantially different from estimate of effect.
Very Low	Little confidence; true effect likely substantially different from estimate of effect.

GRADE Definition of Strong and Weak Recommendation

Recommendations are based on the overall quality of the evidence. GRADE methodology suggests the phrases "the guideline authors recommend" for strong evidence, and "the guideline authors conditionally recommend" for weaker evidence.

	Strong Recommendation	Weak/Conditional Recommendation
For patients	Most patients would want the recommended course of action.	Most patients would want the recommended course of action, but many would not.
For clinicians	Most patients should receive the recommended course of action.	Different choices will exist for different patients, and clinicians should help patients decide.
For policy makers	Recommended course should be adopted as policy.	Considerable debate and stakeholder involvement needed to make policy.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Firearm-related injuries

Guideline Category

Prevention

Clinical Specialty

Critical Care

Emergency Medicine

Preventive Medicine

Intended Users

Other

Physicians

Public Health Departments

Guideline Objective(s)

To evaluate the effect of legislative efforts to curb gun violence in the United States, particularly the effect of restrictive licensing and concealed carry laws (CCLs) on the prevention of firearm injuries

Target Population

All individuals in the United States

Interventions and Practices Considered

1. Restrictive gun licensing
2. Concealed carry laws (CCLs) (not recommended)

Major Outcomes Considered

Firearm injuries, including nonfatal injuries, homicides, and suicides

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Inclusion Criteria for this Review

Study Types

Studies included randomized controlled trials, prospective and retrospective observational studies, and case-control studies. Case reports, conceptual pieces, and reviews containing no original data or analyses were excluded. The guideline authors excluded editorials, opinion articles, and studies not addressing the Population, Intervention, Comparator, and Outcome (PICO) questions. All studies published between January 1, 1900, and April 30, 2016 were included. The authors did not restrict by publication language, but they limited their analysis to studies of the United States population.

Participant Types

All relevant studies, irrespective of age, race, sex, or other demographic characteristics, were included.

Intervention Types

All studies which evaluated the effects of restrictive licensing and concealed carry laws (CCLs) on the prevention of firearm-related injuries were reviewed.

Outcome Measure Types

The review was limited to studies in which a firearm injury was the outcome; the guideline authors included fatal and nonfatal injuries, and included both intentional and unintentional mechanisms.

Review Methods

Search Strategy

References were identified by research librarians using the MEDLINE database in the National Library of Medicine; the National Institutes of Health was searched using Entrez PubMed. Additionally, the following databases were also searched: EMBASE, Cochrane Central Register of Controlled Trials, PsycINFO, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Science Citation Index, Social Sciences Citation Index, Art and Humanities Citation Index, and Conference Proceedings Citation Index. The initial search was performed in November 2013, then a second search in June 2015, and a final search in April 2016. The search was designed to identify all citations regarding the prevention of firearm-related injuries by restrictive licensing and/or CCLs. In addition to the electronic search, the guideline authors manually searched the bibliographies of recent reviews and articles. Figure 1 in the original guideline document contains the medical subject heading terms used for the literature searches.

Study Selection

After each literature search, two independent reviewers screened the titles and abstracts, excluding reviews, case reports, articles in which injury was not the outcome measure, and unrelated articles. The resulting studies were used for the review. The study selection process is displayed in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram in Figure 2 of the original guideline document.

Number of Source Documents

As of 2016, a total of 27 studies were included for analysis. Of the original 4,673 studies identified, 3,623 remained after removing duplicates. Two hundred twenty-five case reports, case series, and reviews were excluded, and 3,379 studies were removed because they did not focus on firearm injury prevention or did not address the comparators of interest. Finally, seven additional studies were identified in two separate, subsequent literature reviews. This left a total of 14 studies which merited inclusion for Population, Intervention, Comparator, Outcome) PICO 1 and 13 studies merited inclusion for PICO 2. All studies were in English, and all were from the United States (see Tables 1 and 2 in the original guideline document).

Refer to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram (Figure 2) in the original guideline document.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Methodology Levels for Rating the Quality of Evidence

Quality Level	Definitions
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Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Data Extraction and Management

All references used for the review were entered into a Microsoft Excel spreadsheet containing information on authors, article title, study methodology, and intervention and outcome measures. A master copy was provided to all reviewers. All articles, grading resources, and instructions were electronically available to all members of the writing team. Each independent reviewer shared his or her Population, Intervention, Comparator, Outcome (PICO) sheet and literature review with all members of the team. Independent interpretations of the data were shared through group email, conference calls, and in-person discourse. No major reviewer discrepancies in grading occurred.

Methodologic Quality Assessment

The guideline authors used the validated Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology for this study (see the "Availability of Companion Documents" field). The GRADE methodology entails the creation of a pre-determined PICO question or set of PICO questions that the literature must answer. A rank order (1–9) is assigned to each outcome in terms of importance. For this particular study, all outcomes were determined to be GRADE rank order 9, or critically important.

Each designated reviewer independently evaluated the data in aggregate with respect to the quality of the evidence to adequately answer each PICO question and quantified the strength of any recommendations. Reviewers are asked to determine effect size, risk of bias, inconsistency, indirectness, precision, and publication bias.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

A broad-based committee of surgeons and nurses was formed from the membership of the Eastern Association for the Surgery of Trauma Injury Control and Violence Prevention Section, and the Eastern Association for the Surgery of Trauma Guidelines Section. The team included individuals with a range of research experience and many with military and/or civilian law enforcement backgrounds. The guideline authors created the Populations, Intervention, Comparator, and Outcome (PICO) questions of interest. All group members felt that any type of firearm injuries, fatal or nonfatal, were critically important to answering the questions.

Population (P), Intervention (I), Comparator (C), and Outcome (O) (PICO) Questions

PICO 1

Population: All individuals in the U.S.

Intervention: Restrictive gun licensing

Comparator: No restrictive gun licensing

Outcome: Firearm injuries, including nonfatal injuries, homicides, and suicides

PICO 2

Population: All individuals in the United States

Intervention: Concealed carry laws

Comparator: No concealed carry laws

Outcome: Firearm injuries, including nonfatal injuries, homicides, and suicides

Rating Scheme for the Strength of the Recommendations

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Definition of Strong and Weak Recommendation

Recommendations are based on the overall quality of the evidence. GRADE methodology suggests the phrases "the guideline authors recommend" for strong evidence, and "the guideline authors conditionally recommend" for weaker evidence.

	Strong Recommendation	Weak/Conditional Recommendation
For patients	Most patients would want the recommended course of action.	Most patients would want the recommended course of action, but many would not.
For clinicians	Most patients should receive the recommended course of action.	Different choices will exist for different patients, and clinicians should help patients decide.
For policy	Recommended course should be adopted as policy.	Considerable debate and stakeholder involvement needed to make policy.

makers	Strong Recommendation	Weak/Conditional Recommendation

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

The overall quality of evidence was weak. There were no randomized controlled clinical trials, some case-control studies, mostly retrospective data and some reviews. However, though the quality of each individual study was weak, the magnitude and direction of the effect sizes were sufficiently similar to allow the guideline authors to draw conclusions for both questions.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- After evaluating the best available data, the committee found an association between more restrictive licensing, criminal background checks, and lower firearm injury rates.
- With respect to individual provisions, background checks appear to be particularly impactful, but it must be noted that the data are mixed on other provisions, such as gun safety locks. These studies are also supported by the international experience, where more stringent gun control laws have been associated with lower firearm homicide and suicide rates, and fewer mass shootings.

Potential Harms

Methods to prevent firearm injuries are controversial, particularly because many of these methods involve some form of restricted access to guns, which some argue is a violation of our constitutional right to bear arms.

Qualifying Statements

Qualifying Statements

Qualifying Statements

- The Eastern Association for the Surgery of Trauma (EAST) is a multi-disciplinary professional society committed to improving the care of injured patients. The Ad Hoc Committee for Practice Management Guideline Development of EAST develops and disseminates evidence-based information to increase the scientific knowledge needed to enhance patient and clinical decision-making, improve health care quality, and promote efficiency in the organization of public and private systems of health care delivery. Unless specifically stated otherwise, the opinions expressed and statements made in this publication reflect the authors' personal observations and do not imply endorsement by nor official policy of EAST.
- "Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances."* These guidelines are not fixed protocols that must be followed, but are intended for health care professionals and providers to consider. While they identify and describe generally recommended courses of intervention, they are not presented as a substitute for the advice of a physician or other knowledgeable health care professional or provider. Individual patients may require different treatments from those specified in a given guideline. Guidelines are not entirely inclusive or exclusive of all methods of reasonable care that can obtain/produce the same results. While guidelines can be written that take into account variations in clinical settings, resources, or common patient characteristics, they cannot address the unique needs of each patient nor the combination of resources available to a particular community or health care professional or provider. Deviations from clinical practice guidelines may be justified by individual circumstances. Thus, guidelines must be applied based on individual patient needs using professional judgment
- Most trauma surgeons in the United States are disturbingly familiar with the tragic effects of gun violence. As part of their duty to injury prevention, practitioners are also citizens, and should consider the effects of local, state, and federal laws and ordinances governing restrictions on ownership and carrying of firearms, because they ultimately affect firearm injuries.
- The guideline authors encountered many challenges in their data collection and analysis, in particular, the heterogeneity of studies, methodologies used, different covariates for each study, differing modeling strategies, and even the differences between the laws themselves and state enforcement. For these reasons, they did not attempt a meta-analysis, nor did they attempt a forest plot of their results, given that the contextual nature of each study precluded a simple visual comparison. The overall quality of evidence with regards was weak. There were no randomized controlled clinical trials, some case-control studies, mostly retrospective data and some reviews. The risk of both publication bias and insufficient control for confounders in the study samples was significant. Finally, several authors, notably Webster and Hemenway, contributed to many of the articles. Therefore, one cannot discount the possibility of investigator or publication bias.

*Institute of Medicine. Clinical practice guidelines: directions for a new program. MJ Field and KN Lohr (eds) Washington, DC: National Academy Press. 1990: pg 39.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Safety

Identifying Information and Availability

Bibliographic Source(s)

Crandall M, Eastman A, Violano P, Greene W, Allen S, Block E, Christmas AB, Dennis A, Duncan T, Foster S, Goldberg S, Hirsh M, Joseph D, Lommel K, Pappas P, Shillinglaw W. Prevention of firearm-related injuries with restrictive licensing and concealed carry laws: an Eastern Association for the Surgery of Trauma systematic review. J Trauma Acute Care Surg. 2016 Nov;81(5):952-60. [43 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2016 Nov

Guideline Developer(s)

Eastern Association for the Surgery of Trauma - Professional Association

Source(s) of Funding

Eastern Association for the Surgery of Trauma (EAST)

Guideline Committee

Prevention of Firearm-Related Injuries Practice Management Guidelines Committee

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Financial Disclosures/Conflicts of Interest

The authors declare no conflicts of interest.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the Eastern Association for the Surgery of Trauma (EAST) Web site.

Availability of Companion Documents

The following is available:

Kerwin AJ, Haut ER, Burns JB, Como JJ, Haider A, Stassen N, Dahm P, Eastern Association for the Surgery of Trauma Practice Management Guidelines Ad Hoc Committee. The Eastern Association of the Surgery of Trauma approach to practice management guideline development using Grading of Recommendations Assessment, Development, and Evaluation (GRADE) methodology. J Trauma Acute Care Surg. 2012 Nov;73(5 Suppl 4):S283-7. Available from the Eastern Association for the Surgery of Trauma (EAST) Web site.

Patient Resources

None available

NGC Status

This NGC summary was updated by ECRI Institute on February 13, 2017. The information was verified by the guideline developer on February 20, 2017.

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